

(Set-Q₁)
B.Tech-3rd (Mech)
Manufacturing Science and Technology-I

Full Marks : 70

Time : 3 hours

Attempt Q.No.1 and any other five questions

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

- (a) What are the factors influencing the permeability of sand (name three) ?
- (b) What are the gases used as fluxes for purging or flushing of liquid metal before pouring into the mold ?
- (c) What are different pattern allowances ? Which is a negative allowance ?
- (d) What are two specific reasons for development of hot tears in metal castings ?

(Turn Over)

- (e) What are safety precautions in welding ?
- (f) What are the functions of a core ? What are core prints ?
- (g) Mention applications of soldering as a joining process.
- (h) What is "arc blow" in weldings ?
- (i) Mention typical arc welding defects.
- (j) A helical fluted slab milling cutter of 200 mm diameter with 10 cutting edges or teeth is milling a work piece at 93 m/min with a feed of 0.1 mm/tooth. Determine the table speed in mm/min.

2. (a) What are the different design considerations in the gating system to avoid aspiration in casting processes ? 5
- (b) What are the functions of riser in sand casting ? Why is a blind riser smaller than open top riser ? What is the function of William's core in a blind riser ? 5

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(Continued)

3. (a) Show schematically the hot-chamber die-casting process. Why is the advantageous of die casting in getting superior properties compared to sand casting ? 5
- (b) Give a step-by-step process sequence for the investment casting process with schematic sketch. 5
4. (a) What is micro-segregation or coring in casting ? What are the advantages of using eutectic alloys for shape casting ? 5
- (b) With simple sketches, explain electron beam welding (EBW) process. What are the advantages of EBW over other conventional welding processes ? 5
5. (a) How do we define heat affected zone (HAZ) in a welded joint ? What are the factors influencing the size of the HAZ ? 5
- (b) With simple sketches, explain gas tungsten arc welding (GTAW or TIG). Briefly explain the role of the inert gas in this welding process. 5

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(Turn Over)

6. (a) Briefly explain the 3 types of flames in oxy-acetylene gas welding and their applications. 5
- (b) Name any 3 possible constituents of electrode coating and their functions in a Manual metal arc welding process. 5
7. (a) Briefly explain a method for non-destructive inspection of weld defects. 5
- (b) A centre lathe is driven by a 3 phase induction motor having a rotational speed of 1440 rpm. The motor is connected to the headstock via belt-pulley mechanism. The diameter of the pulley on the motor spindle is 200 mm and that on the input shaft of the headstock is 300 mm. For a particular combination of gears in the headstock, the main spindle rotates at 144 rpm. What would be the rotational speed of the main spindle (i) if motor speed is increased to 2880 rpm and (ii) if the pulleys are interchanged (motor speed being 2880 rpm) ? 5

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(Continued)

8. (a) A grinding wheel is specified as A60K8V. Explain the grinding wheel specification. 5
- (b) A spur gear with 45 teeth is required to be machined in milling machine. Explain indexing procedure with a neat diagram of the indexing mechanism. 5

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